Gen.
Mahr.

CONTENTS

Iron, Aluminum and Manganese in the Soil Solution of Hawaiian Soils. W. T. McGeorge 1
Alkali Soil Investigations: II. Origin of Alkali Soils; Physical Effects of Treatments. J. S. Joffe and H. C. McLean 13
Some Changes Brought About in Cylinder Soils by Long-continued Crop and Fertilizer Treatment. A. W. Blair and A. L. Prince 31
The Aeration of Soils as Influenced by Air-Barometric Pressure Changes. George J. Bouyoucos and M. M. McCool 53
Soil Series and Types from the Standpoint of Hydrogen-Ion Concentration and Lime Requirement. J. S. Jones 65
A Comparison of Several Qualitative Tests for Soil Acidity. Horace J. Harper and H. G. M. Jacobson 75
The Comparative Effects of Additions of Nitrogen, Phosphorus and Potassium on the Nitrogen Economy of a Wooster Silt Loam Soil. Vincent H. Morris 87
The Influence of the Removal of Colloids on Some Soil Properties. M. M. McCool and L. C. Wheeting 99
The Influence of Water on Soil Granulation. George J. Bouyoucos 103
Some Effects of Sulfur on Crops and Soils. Henry R. Adams 111
A Study of Several Organic Soil Profiles. M. M. McCool and A. G. Weidemann 117
Note on the Absorption of Bases by Soils. N. M. Comber and S. J. Saint 131
Alkali Soil Investigations: III. Chemical Effects of Treatments. J. S. Joffe and H. C. McLean 133
Secular and Seasonal Changes in the Soil Solution. John S. Burd and J. C. Martin 151
The Effect on Present Soil Reaction of Long-continued Applications of Equivalent Amounts of High Calcium and High Magnesium Limes. Paul S. Burgess 169
The Relation of Moisture and Available Nitrogen to the Yield and Protein Content of Wheat. Ray E. Neidig and Robert S. Snyder 173
Further Studies on Soil Profiles. M. M. McCool and A. G. Weidemann 181
Action of Stable Manure in the Decomposition of Cellulose in Tilled Soil. Chr. Barthel and N. Bengtsson 185
Residual Effects of Forty Years Continuous Manurial Treatments. I. Effect of Lime on Decomposition of Soil Organic Matter. J. W. White and F. J. Holben 201
Nitrification in Some South African Soils: Part II. Thomas D. Hall 219
Alkali Soil Investigations: IV. Chemical and Biological Effects of Treatments. J. S. Joffe and H. C. McLean 237
The Determination of Ammonia in Soil. N. Bengtsson 255
The Influence of Phosphate, Biphosphate, Carbonate, Silicate and Sulfate of Calcium, Sodium and Potassium on Plant Growth in Acid Mineral Soils. Koji Miyake, Ishio Tamachi and Junjiro Konno 279
The Availability of Nitrogen in Peat. C. B. Lipman and N. E. Wank 311
Influence of Sulfur Oxidation on Solubility of Soil Minerals. R. E. Stephenson and W. L. Powers 317
The Influence of Nitrifying Bacteria on the Growth of Barley. E. B. Fred 323
Methods of Studying the Strength of Soil Acids. J. W. Tidmore and F. W. Parker 331
A Note on the Protozoan Fauna of the Soils of the United States. R. V. Allison 339

The Influence of Sodium Chloride upon Alfalfa Grown in Solution Cultures. S. LOMANITZ 353
Notes on a Method for the Determination of Sulfur in Soil. M. I. WOLKOFF 371
The Alkali Soils in Hungary and Their Reclamation. ALEXIUS A. J. DE'SIGMOND 379
Soil Acidity in Relation to Soil Type Groups, in Nacogdoches County, Texas. B. H. HENDRICKSON 383
The Chemico-Physical Influences of Quick Lime and Calcium Carbonates on Mineral Soils. E. RAMANN 387
The Electrical Charge on a Clay Colloid as Influenced by Hydrogen-Ion Concentration and by Different Salts. WALTER C. DAYHUFF AND D. R. HOAGLAND 401
The Determination of Ammonia in Soils. HORACE J. HARPER 409
Drying of Soil, as one of the Natural Factors in Maintaining Soil Fertility. A. N. LEBEDJANTZEV 419
Alkali Studies: I. Tolerance of Wheat for Alkali in Idaho Soil. RAY E. NEIDIG AND H. P. MAGNUSON 449
Effect of Iron and Aluminum Salts on the Phosphorus Recovery from Soils and Quartz Sand Treated with Tennessee Rock or Double Acid Phosphate. M. I. WOLKOFF .. 469
Synthetic Calcium Silicates as a Source of Agricultural Lime: I. A Comparison of the Influence of Synthetic Calcium Silicates with Other Forms of Lime as Affecting Plant Growth. R. MARLIN BARNETTE 479

ILLUSTRATIONS

PLATES

The Influence of Water on Soil Granulation

Plate 1. Illustrations Showing the Tendency of Water to Cause Dense and Hard Masses of Soil to Crumble into Granular Structure.

Fig. 1. The ball to the extreme left is as hard as rock; upon being moistened it cracks and begins to crumble as shown in the balls to the right.... 109

2. Block to the left is as hard as rock; upon being moistened it cracks and begins to crumble as shown in the next block of soil..... 109

3. Ball at the center is as hard as rock; upon being placed in excess of water it slakes into fine granules. When these granules dry, they are in a loose condition..... 109

A Study of Several Organic Soil Profiles

Plate 1. Four-inch Cube of Organic Soil, After Drying, Taken at Depth Indicated Below Each Cube.

Fig. 1. Cubes taken from Farm lane deposit..... 129

2. Cubes taken from Thorp's deposit..... 129

3. Cubes taken from Shaw's deposit..... 129

Residual Effects of Forty Years' Continuous Manurial Treatments.

I. Effect of Lime on Decomposition of Soil Organic Matter

Plate 1. Charcoal Found on Limestone Plot of Tier 4.

Fig. 1. Coarse charcoal taken from the surface of the soil washed free from adhering soil..... 217

2. Color of soil of areas 8 and 9 where finely divided charcoal is incorporated with the surface soil..... 217

3. Normal Soil..... 217

Alkali Soil Investigations: IV. Chemical and Biological Effects of Treatments

Plate 1. Photograph Showing Crop of Millet Following Barley on Leached Soils..... 253

The Influence of Phosphate, Biphosphate, Carbonate, Silicate and Sulfate of Calcium, Sodium and Potassium on Plant Growth in Acid Mineral Soils

Plate 1. Fig. 1. Growth of barley on June 15 in Kutchan acid mineral soil showing the effect of the addition of calcium compounds..... 297

2. Growth of barley on June 15 in Kutchan acid mineral soil showing the effect of the addition of potassium compounds..... 297

Plate 2. Fig. 1. Growth of barley on June 15 in Kutchan acid mineral soil showing the effect of the addition of sodium compounds..... 299

2. Plants shown in plate 1, figure 1, as they appeared on July 28..... 299

Plate 3. Fig. 1. Plants shown in plate 1, figure 2, as they appeared on July 28..... 301

2. Plants shown in plate 2, figure 1, as they appeared on July 28..... 301

Plate 4. Fig. 1. Growth of barley on June 15 in Kutchan acid mineral soil, with ammonium sulfate and calcium carbonate as sources of plant-food, showing the effect of the addition of various salts..... 303

Fig. 2. Growth of barley on June 15 in Kutchan acid mineral soil, with ammonium sulfate, calcium carbonate and potassium phosphate as sources of plant-food, showing the effect of the addition of various salts..... 303
Plate 5. Fig. 1. Growth of barley on June 15 in Tayoro acid mineral soil, with ammonium sulfate and calcium carbonate as sources of plant-food, showing the effect of the addition of various salts..... 305
2. Growth of barley on June 15 in Tayoro acid mineral soil, with ammonium sulfate, calcium carbonate and potassium phosphate as sources of plant-food, showing the effect of the addition of various salts..... 305
Plate 6. Fig. 1. Plants shown in plate 4, figure 1, as they appeared on July 28..... 307
2. Plants shown in plate 4, figure 2, as they appeared on July 28..... 307
Plate 7. Fig. 1. Plants shown in plate 5, figure 1, as they appeared on July 28..... 309
2. Plants shown in plate 5, figure 2, as they appeared on July 28..... 309

THE INFLUENCE OF NITRIFYING BACTERIA ON THE GROWTH OF BARLEY

Plate 1. Barley in Sand Cultures Showing Effect of Sulfate of Ammonia and Nitrification..... 327
2. Effect of Nitrification on Growing Barley..... 329

THE INFLUENCE OF SODIUM CHLORIDE UPON ALFALFA GROWN IN SOLUTION CULTURES

Plate 1. Photo Showing the Method of Growing Alfalfa Seedlings..... 369

TEXT-FIGURES

ALKALI SOIL INVESTIGATIONS: II. ORIGIN OF ALKALI SOILS; PHYSICAL EFFECTS OF TREATMENTS

Fig. 1. Rise of Capillary Water in Unleached Soils of the First Series of Experiments after 14 Days Incubation..... 22
2. Rise of Capillary Water in Unleached Soils of the First Series of Experiments after 60 Days Incubation..... 22
3. Rise of Capillary Water in Alkali Soils of First Series after 95 Days Incubation.. 23
4. Rise of Capillary Water in Unleached Alkali Soils of the First Series of Experiments after 140 Days Incubation..... 23
5. Rise of Capillary Water in Leached Alkali Soils of the Second Series of Experiments after 30 Days Incubation..... 24
6. Rise of Capillary Water in Leached Alkali Soils of the Second Series of Experiments after 75 Days Incubation..... 24
7. Rise of Capillary Water in Leached Alkali Soils of the Second Series after 140 Days Incubation..... 25
8. Rise of Capillary Water in Unleached Alkali Soils of the Second Series of Experiments after 190 Days Incubation..... 25

SOME CHANGES BROUGHT ABOUT IN CYLINDER SOILS BY LONG-CONTINUED CROP AND FERTILIZER TREATMENT

Fig. 1. Diagram of Experiment..... 33

THE AERATION OF SOILS AS INFLUENCED BY AIR-BAROMETRIC PRESSURE CHANGES

Fig. 1. Daily March of Barometric Pressure in Air and in Sand at a Depth of 10 Feet... 55
2. Daily March of Barometric Pressure in Air and in Sandy Loam at a Depth of 10 Feet..... 56

3. Daily March of Barometric Pressure in Air and in Silt Loam at Depths of 2 and 10 Feet 56
4. Daily March of Barometric Pressure in Air and in Clay Loam at a Depth of 10 Feet 56
5. Daily March of Barometric Pressure in Air and in Clay at Depths 2, 6, and 10 Feet 57
6. Daily March of Air Barometric Pressure for the Year 1923 58
7. Difference in Daily Variation of Air Barometric Pressure at Different Latitudes .. 60

THE INFLUENCE OF THE REMOVAL OF COLLOIDS ON SOME SOIL PROPERTIES

Fig. 1. Titration Curves with Limewater on the Soil Containing an Abundant Supply of Organic Matter 100
2. Titration Curves with Limewater on the Soil Almost Free from Organic Matter. 100

ACTION OF STABLE MANURE IN THE DECOMPOSITION OF CELLULOSE IN TILLED SOIL

Fig. 1. Lovén Flask with Special Stopper Used in the Experiments 189

RESIDUAL EFFECTS OF FORTY YEARS CONTINUOUS MANURIAL TREATMENTS. I. EFFECT OF LIME ON DECOMPOSITION OF SOIL ORGANIC MATTER

Fig. 1. Plan of Pennsylvania Field Plot Experiments "General Fertilizer Series" 1881–1921 203

NITRIFICATION IN SOME SOUTH AFRICAN SOILS: PART II

Fig. 1. A Comparison of the Variation in Nitric Nitrogen in Parts per Million in the First Foot of Soil, with the Per Cent of Soil Moisture at the Time of Sampling and the Rainfall During the Same Period 220
2. A Comparison of Soil and Air Temperature During the Period of the Determination of the Nitric Nitrogen, 1921–1922 222
3. Per Cent Nitrogen in First 6 Feet of Soil 228

THE AVAILABILITY OF NITROGEN IN PEAT

Fig. 1. Graphical Comparison of Actual Yields of Series, Marking Allowance for the Probable Experimental Error 314
2. Enlarged Portion of Figure 1, Showing Relations of Peats and Control 314

METHODS OF STUDYING THE STRENGTH OF SOIL ACIDS

Fig. 1. The Strength of the Soil Acids as Indicated by the Hydrogen-Ion Concentration, Sugar Inversion, and the Truog Avidity Method 334

A NOTE ON THE PROTOZOAN FAUNA OF THE SOILS OF THE UNITED STATES

Fig. 1. Numbers of Active Amoebae (Dimastigamoeba and sp.) and Bacteria in 1 Gm. of Field Soil for Typical Periods in February and April 341

THE INFLUENCE OF SODIUM CHLORIDE UPON ALFALFA GROWN IN SOLUTION CULTURES

Fig. 1. Graphic Summary of Data Determined 361

SOIL ACIDITY IN RELATION TO SOIL TYPE GROUPS, IN NACOGDOCHES COUNTY, TEXAS

Fig. 1. Mean Acidity for Soil Type Groups 384

THE DETERMINATION OF AMMONIA IN SOILS

Fig. 1. Comparison of Ammonia Secured from a Soil by Successive Determinations with Different Methods 415

ALKALI STUDIES: I. TOLERANCE OF WHEAT FOR ALKALI IN IDAHO SOIL

Fig. 1. Graphs of Averages of Duplicate Pots, Showing Additions and Recoveries of Each Salt and of Total Sodium Salts, Germination of Each Crop, Percentage Yield of Each Crop, and of Total of the Two Crops, Using the Average of the Checks as 100 Per Cent. 457
2. Graphs of Averages of Duplicate Pots, Showing Additions and Recoveries of Each Salt and of Total Sodium Salts, Germination of Each Crop, Percentage Yield of Each Crop, and of Total of the Two Crops, Using the Average of the Checks as 100 Per cent. 458
3. Graphs of Averages of Duplicate Pots, Showing Additions and Recoveries of Each Salt and of Total Sodium Salts, Germination of Each Crop, Percentage Yield of Each Crop, and of Total of the Two Crops, Using the Average of the Checks as 100 Per cent. 459

EFFECT OF IRON AND ALUMINUM SALTS ON THE PHOSPHORUS RECOVERY FROM SOILS AND QUARTZ SAND TREATED WITH TENNESSEE ROCK OR DOUBLE ACID PHOSPHATE

Fig. 1. Effect of Ferric Chloride, Aluminum Chloride and Calcium Carbonate Singly and in Different Combinations, on the Per Cent of Phosphorus Recovery by Means of 0.2 *N* HNO_3 from Fine Silica Flour Treated with Finely Ground Rock Phosphate. 475